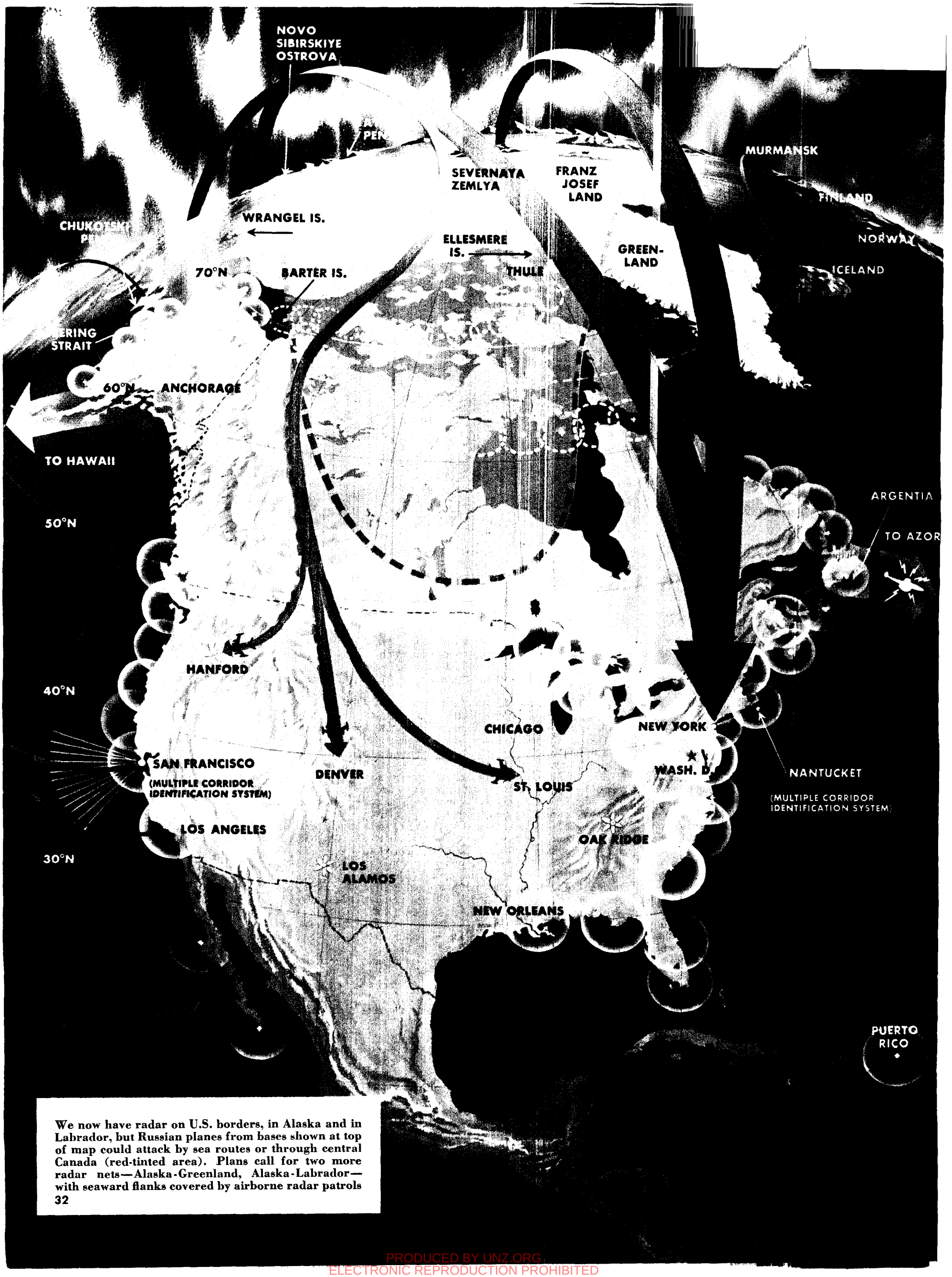


We now have radar on U.S. borders, in Alaska and in Labrador, but Russian planes from bases shown at top of map could attack by sea routes or through central Canada (red-tinted area). Plans call for two more radar nets—Alaska-Greenland, Alaska-Labrador—with seaward flanks covered by airborne radar patrols

RUSSIAN PLANES Are Raiding Canadian Skies

By WILLIAM A. ULMAN

They sneak in almost daily, our northern outposts report. And now that Russia has the H-bomb we're wide open to attack. What's being done about it? The author, seeking the answer, visited installations so secret he can't say he's seen them, flew thousands of miles—and saw the Red intruders himself. We *are* building a defense. Here's the story

OUTSIDE, the arctic summer day was crisp and clear; the waters of Bering Strait shone dully in the distance. Inside the big alert hangar of the jet-fighter interceptor squadron the atmosphere was deceptively casual. There were 13 of us gathered in the fliers' hot room: six pilots, six flying radar officers and myself, a reporter seeking the most critical story of our time—the story of America's present line of defense against Malenkov's H-bomb.

We were sitting around playing poker, but we were dressed in dark-blue high-altitude pressure suits, ready for any emergency. And suddenly, as we sat there, it came: the blast of the scramble horn. A captain sitting across the table hurriedly scraped back his chair, beckoned to me and ran out the door.

One of our big radar stations on the west coast of Alaska had picked up the blip of an unidentified plane on its radarscope—almost certainly a Russian.

Almost every day, at least one unidentified airplane violates our continental borders. "They come in at all times and places," a general in the Alaskan Air Command had told me, "and some have even penetrated deep into north central Canada." Teddy Roosevelt would have called this a shooting war.

To the pilots at our advance interceptor bases, it's not a shooting war—yet. They call the Red reconnaissance planes "spoofs"; their mission apparently is to feel out our radar defenses and photograph our coasts, and when our jets go out to meet them, they run. But someday maybe the Red plane will be a real "bogey"—a Russian who doesn't run—and the pilots whose job it is to chase them off never know that this won't be the day.

They hope the day never comes. That first bogey probably will be accompanied by hundreds more, headed for the United States and carrying what our pilots sardonically call The People's Bomb for Peace and Plenty—the hydrogen bomb, Russian version.

My pilot and I charged down the hangar stairs onto the ramp, and hurried into our Mae Wests, complete with a tricky new pocketful of survival gadgets. Next came the parachutes with an attached collapsible dinghy for a seat cushion, then the big plastic helmets with earphones, microphone, oxygen mask, glareproof visor—everything built in, I thought, except the brains.

In adjacent hangars, the crews of the other two planes making the interception were racing to complete their own preparations.

The ground crew silently and swiftly strapped us into the plane's ejection seats, connected the oxygen hoses and leaped away. We were already moving; a jet needs no warmup. The hydraulically powered canopy snapped down over us and locked.

"Tower to Air Force Jet 994. Cleared for immediate take-off!" It was just 2 minutes, 40 seconds since the horn had first blown. My pilot cut in the afterburner, a jet plane device which instantly increases power thrust by 50 per cent. We sped off the field, banked sharply, then began to climb at top speed to 43,000 feet. By now the operators at the radar control center had taken over our three-plane flight, steering us by voice direction toward the blip on their scope.

Minutes later, we spotted the distant gleam of a Russian reconnaissance plane, speeding back toward its Siberian base. "There he goes," said the pilot. "Always the same story. Let's go home."

We went into a turning dive and headed back for the penny-ante game. The room smelled of fresh coffee and stale smoke as we walked in. The other pilots hardly looked up. The captain returned to his seat, picked up his cards and frowned. "Another of the same," he said. "No sweat."

I could sense his frustration, but I couldn't share it. For me the flight had been both exciting and frightening. I kept thinking: What if that had been many planes instead of just one—planes which didn't turn tail, but kept coming, bound for the States? What did we have to stop at least one of those planes, loaded with a hydrogen bomb, from shattering one of our cities?

The answer, I knew by now, was—not enough.

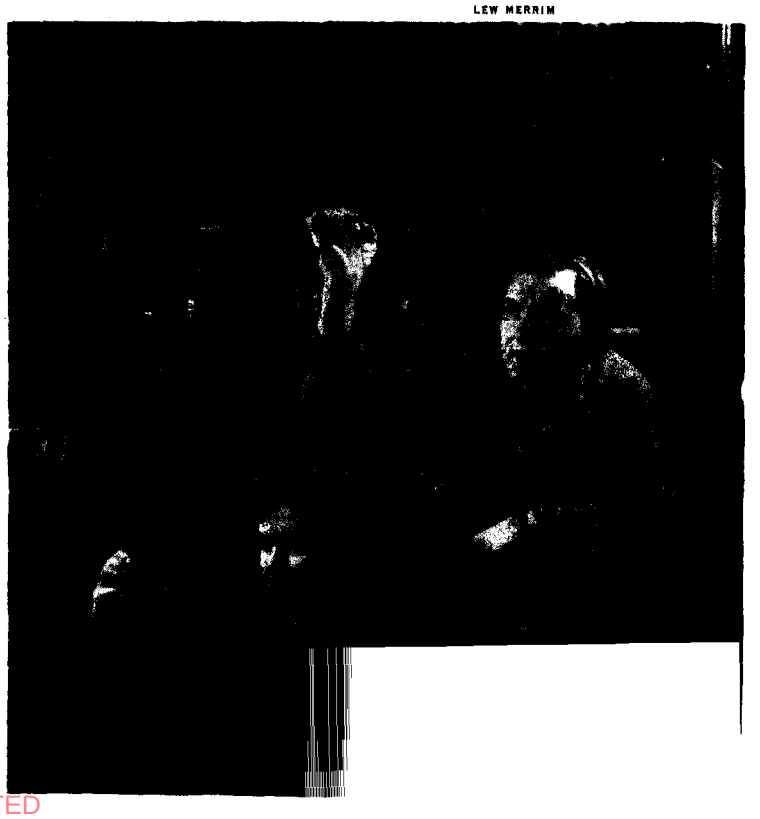
For weeks, I had been on a journalistic survey for Collier's, trying to find the answer to these questions: Can we defend ourselves now against a massive sneak air raid intended to knock us out in a single blow? If not now, when? Just what are the details of our defenses against the new Soviet H-bomb?

In the course of my assignment, I flew thousands of miles in all kinds of jet aircraft from all the edges of our continent. I talked at length with the best military and scientific brains in this country and Canada. I visited the headquarters of our Air Defense Command at Colorado Springs and of the Air Research and Development Command at Baltimore. I have been inside installations where —despite my top-level clearance by the Pentagon—

LEW MERRIM

In radar control center today, mass of data is written backward on transparent board so the officers in front can read it. This method—clumsy, complicated and (due to confusion) potentially dangerous—has been made obsolete by development of a new electronic computer

LEW MERRIM



MAP BY JO KOTULA

Brig. Gen. J. W. McCauley (left, with Maj. M. P. Alger) heads air defense of east central U.S., where one third nation's wealth, one fourth its people could be destroyed by nine H-bombs

some of the equipment was concealed from my eyes. I have even been permitted to enter places I can never admit I've seen, and have spoken to men I must not identify.

Here's what I found:

- We have a partial radar fence along the U.S.-Canadian border, but it's too wide-spaced, too complex and too close to home—"a fence," said one officer grimly, "with no wire strung between the posts." Our border radar won't warn us of attack soon enough; onrushing bombers would reach some of their targets almost as fast as the warning of their approach. At best, the inhabitants of our large Northern cities might have barely time to run for the cellar—and the cellar is no defense against the H-bomb.
- Next year we may be better off. A more effective radar line is being pushed and test stations are being constructed in the Far North; if the first units work, we probably will have a warning net from Alaska to Greenland by the summer of 1954. It will give us from four to six hours' warning of any air attack.
- Sometime later—I'm not permitted to say when—a second row of radar outposts may be strung across Canada in the more easily accessible territory between our present border fence and the new net being built in the arctic. It will confirm the first warning and indicate the actual direction of attack.

Construction Depends on the Weather

The construction of these two northern radar nets depends on the vagaries of arctic weather, the uncertainty of Congressional appropriations and the strategical concepts of our new Joint Chiefs of Staff. The nets, together with our airborne radar at sea, would be tremendous steps forward—perhaps enough to make the difference between the survival and the utter destruction of our country as a major power. The two early-warning lines would be far less expensive than has been widely reported elsewhere—less than a billion and a half dollars, compared with published estimates of between 20 and 150 billions. This whole concept of effective warning at low cost is made possible by two exciting new devices, never before publicly disclosed: a self-watching radarscope and a long-range radio transmitter capable of overcoming the especially difficult communications problems of the arctic.

Right now, our air-defense planners intend to build the two radar fences—weather, Congress and the Joint Chiefs permitting.

- The big gap in our defenses once the radar nets are operating will be fighter planes. We have interceptors in northeastern Canada and in Alaska; in between and on both flanks there are holes the Russians could drive a whole fleet of aerial trucks through.

Obviously, radar nets and fighter protection alike require the same friendly and vigorous cooperation from Canada that the United States has always received in the past. But Canada—although its dilemma today is much like that of a person handcuffed to a man who has been publicly threatened with assassination—has reason to look searchingly at any proposals for joint action put forward by the United States. Our past record has not been entirely consistent—and a Canadian officer I spoke to indicated why.

"Look here," he said, "I believe we'd be glad to let you build a couple of bases in the north-central tundra—but would you man them and keep them manned even after a change in political administrations? Would you send in enough strength to keep the Russians from paratrooping in one day and using the fields as bases against both of our countries?

"We can't afford to build or man them. If you can, fine—but stick to your promises!"

One fact all the experts agree on: something must be done to strengthen our northern air defense system before Russia has an H-bomb production line. If Soviet bombers could claw their way through to our East Coast and drop only nine hydrogen bombs in a line from Boston to Washington, they could blast out of existence a strip 50 miles wide and 450 miles long—a strip containing one fourth the nation's population and one third of its wealth.

* * *

The nerve center of our aerial defense today is in Colorado Springs, a quiet, year-round resort town less than five minutes from Denver by jet plane. There, in a modern four-story office building surrounded by a high wire fence and heavily guarded by sentries, Brigadier General Kenneth P. Bergquist, deputy chief of staff for operations of the Air Defense Command, stood with me at a globe and detailed the story of what we are up against.

"Facing us across the polar flats is a crescent of Russian and Siberian air bases," he said, gesturing. "If you place a bit of string on the globe, starting at the shore of the Murmansk Peninsula, it will curve over the arctic by the shortest route to the Washington-New York-Pittsburgh target area. That's 4,200 miles. From the Russian base at Franz Josef Land, it's only 3,800 miles; from Severnaya Zemlya, 3,875 miles; from the Taymyr Peninsula and Novo Sibirskiye Ostrova Zemlya Islands straight across the pole, 4,500 miles; from Wrangel Island and various points along the Bering Strait or the Chukotski Peninsula, 4,000 to 4,500 miles." From the very positions of these air bases, we know that the Russians can mean to use them only to attack us.

Do they have the planes to do the job?

The Soviet air force is known to have hundreds, perhaps thousands, of the TU-4, a copy of our B-29, which carried the first atomic bombs to Japan. Fanning out from Murmansk and the Chukotski Peninsula, TU-4s could bomb any point in the U.S. except Florida, and still have fuel for an additional 500 miles of flight. Besides the TU-4, the Russians have a new Type 31 turbojet bomber—similar to our B-36 and presumed to carry at least five tons of bomb load at more than 450 miles an hour for at least 5,000 miles.

Should the Reds use either of these planes, they might not get home, but it would scarcely matter—even to the pilots. They could crash land or bail out and permit themselves to be taken prisoner—secure in the knowledge that if a surprise attack came off as planned, the United States would be out of the war almost before it started. A successful one-way knockout raid, sacrificing perhaps the majority of 400 or 500 planes, could kill as many as 35,000,000 Americans and destroy the U.S. as a world power.

Besides the Type 31 and the TU-4, the Russians have developed a light, fast bomber like the B-57 we recently announced. It could carry an atomic or thermonuclear (hydrogen) bomb, but by itself it could never fly the 4,000 miles or so from Russia to the nearest important American target. Does that mean we're ignoring it as a possible participant in a surprise attack? Not by a long shot.

Comment on the New Red Plane

In an Air Force installation, I stood talking to a top scientist and a uniformed Air Force officer about the new Red plane. "The Russkies could do this," said the scientist. "They could put a big TU-4 into the air, then send up two of the new light jet bombers to join it. The two jets could hook onto the TU-4's wing tips, tilting their own wings to maintain the best possible flight characteristics, then cut their own fuel-swilling engines and hitchhike almost all the way to the target on the TU-4's power plant."

I expressed astonishment, and the Air Force officer objected. "In bad weather," he said, "all three of 'em would crash."

"Ah," said the scientist, "but the Russians would never launch the attack in bad weather in the first place. And if the three planes ran into squalls en route, they could simply unhook, make their way through the front separately, then reunite on the other side. A radar operator trying to track them would go crazy. What had looked like one big slow TU-4 would suddenly become one TU-4—and two very fast jet bombers, breaking away in different directions for their own targets."

We stood silent a moment, then the scientist grinned. "I got the Order of the Heroes of the Soviet Union for that one," he said. Then he explained: to test defense theories, he and his colleagues try to foresee the most outlandish schemes the Russians might come up with; for particularly nasty ideas, they "decorate" one another.

Virtually all the air-defense people I questioned about potential Soviet weapons discount the possible use of intercontinental missiles—long-range, atomic versions of the German V-2. Among other reasons, they doubt that materials exist to build such missiles, at least for another 10 to 12 years. They are working on countermeasures just to be safe, but they feel certain that when and if the H-bomb is delivered, it will be carried by aircraft known to us in fact or principle—planes we can destroy, provided we have early enough warning and sufficient defense forces. If Russia were to

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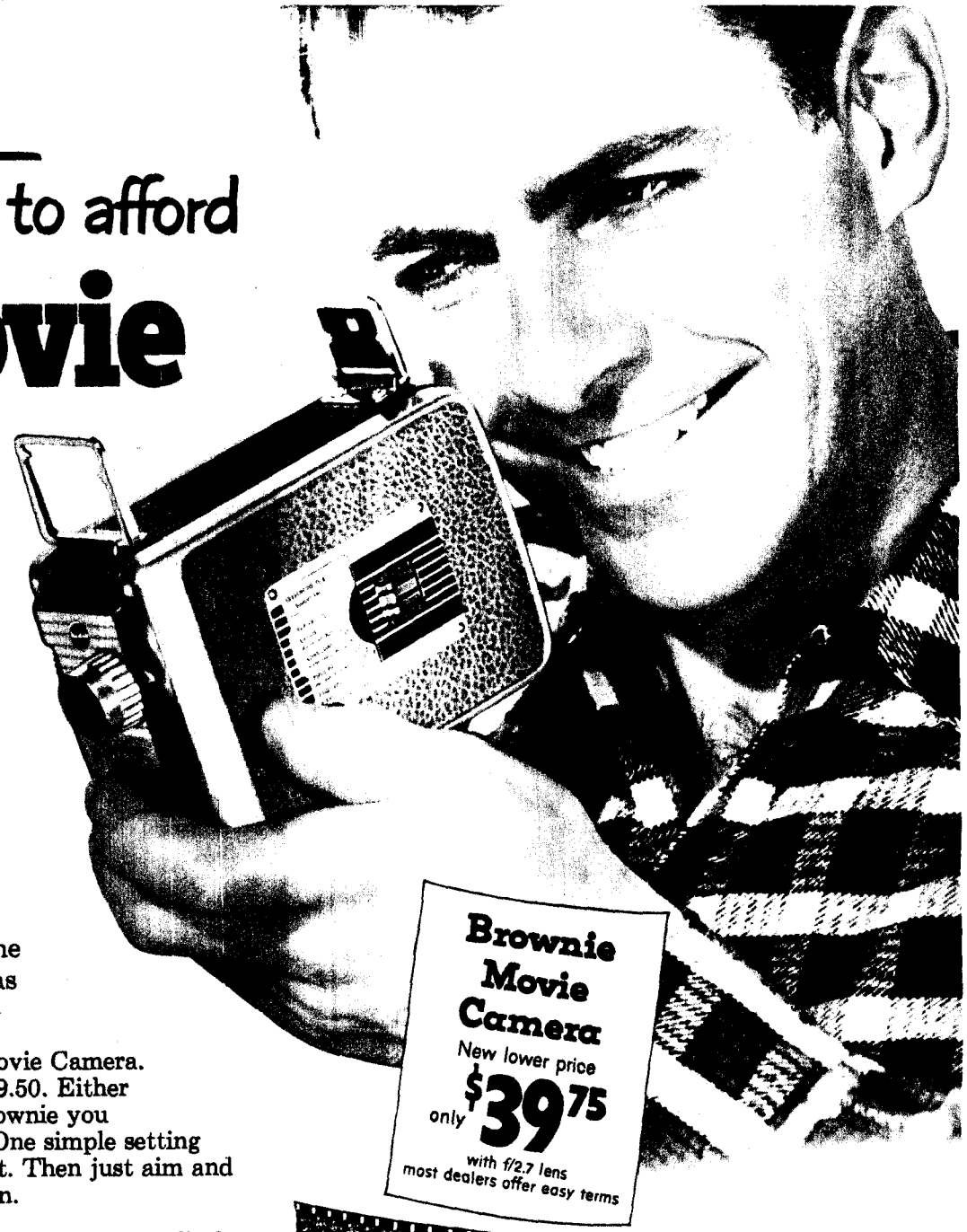

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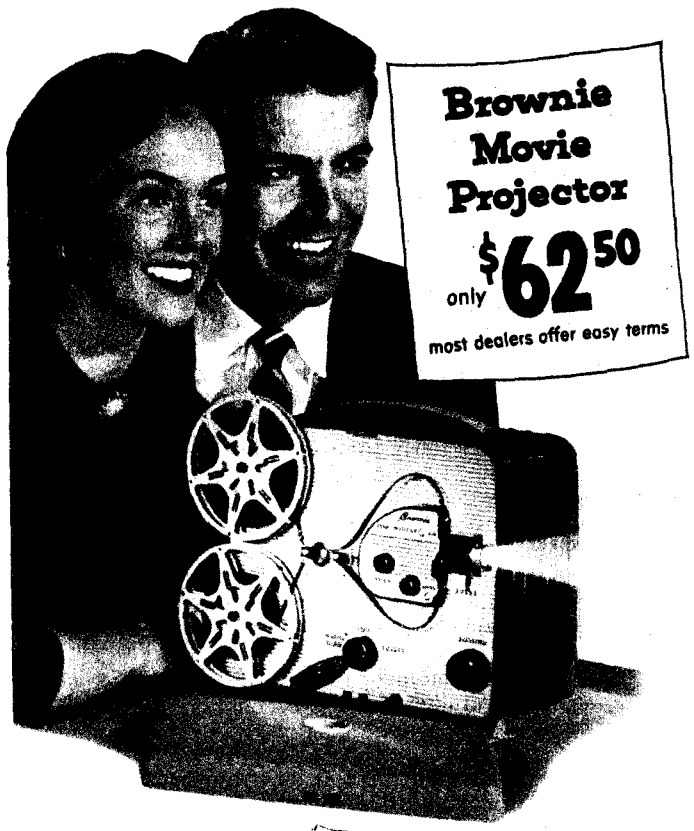

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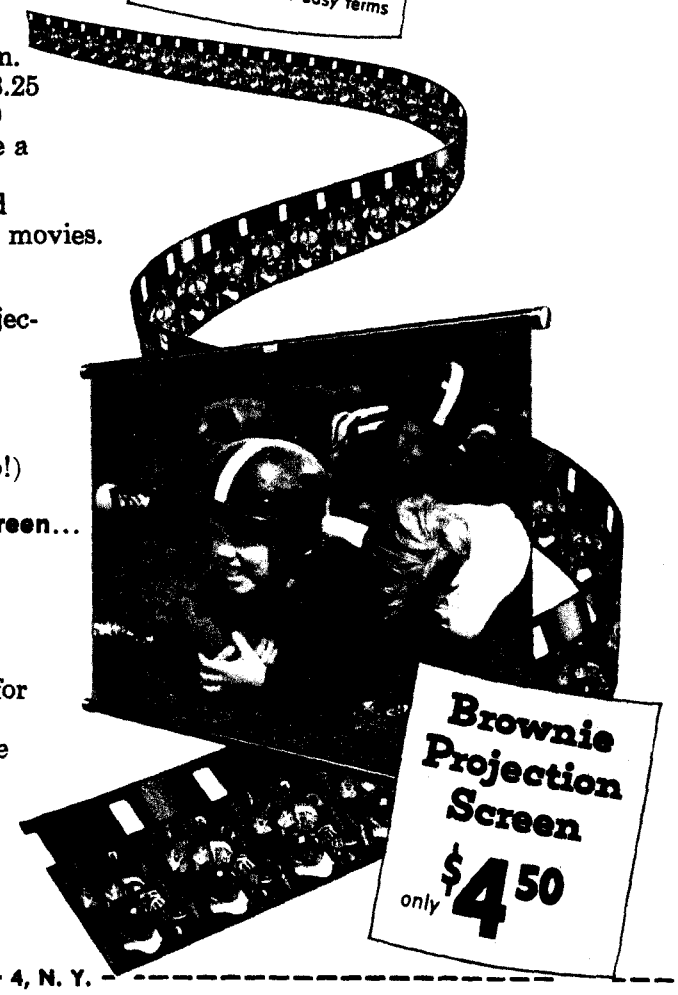

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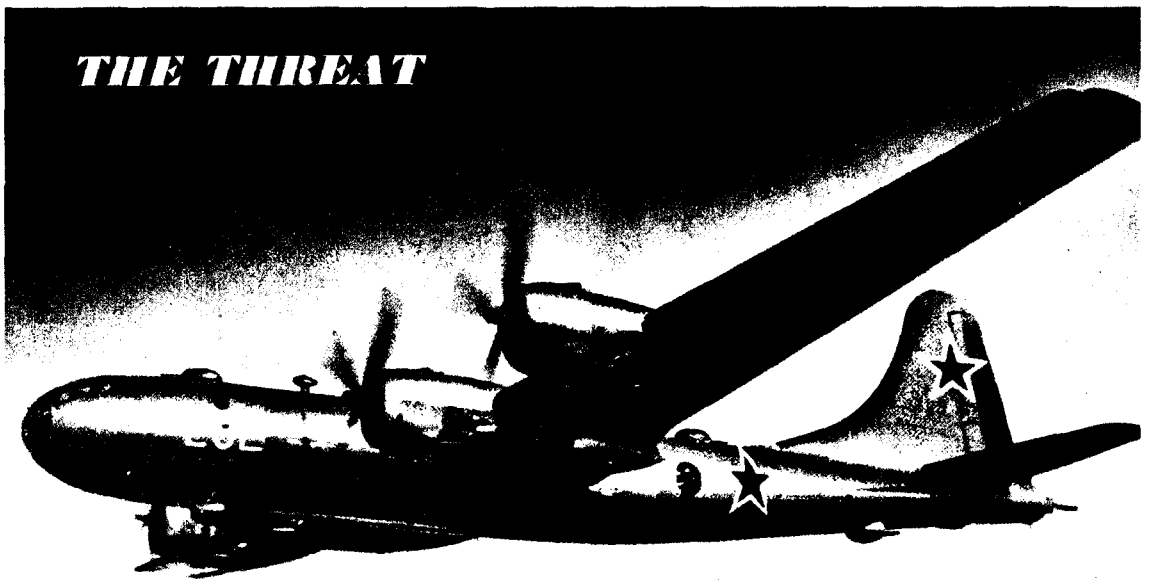
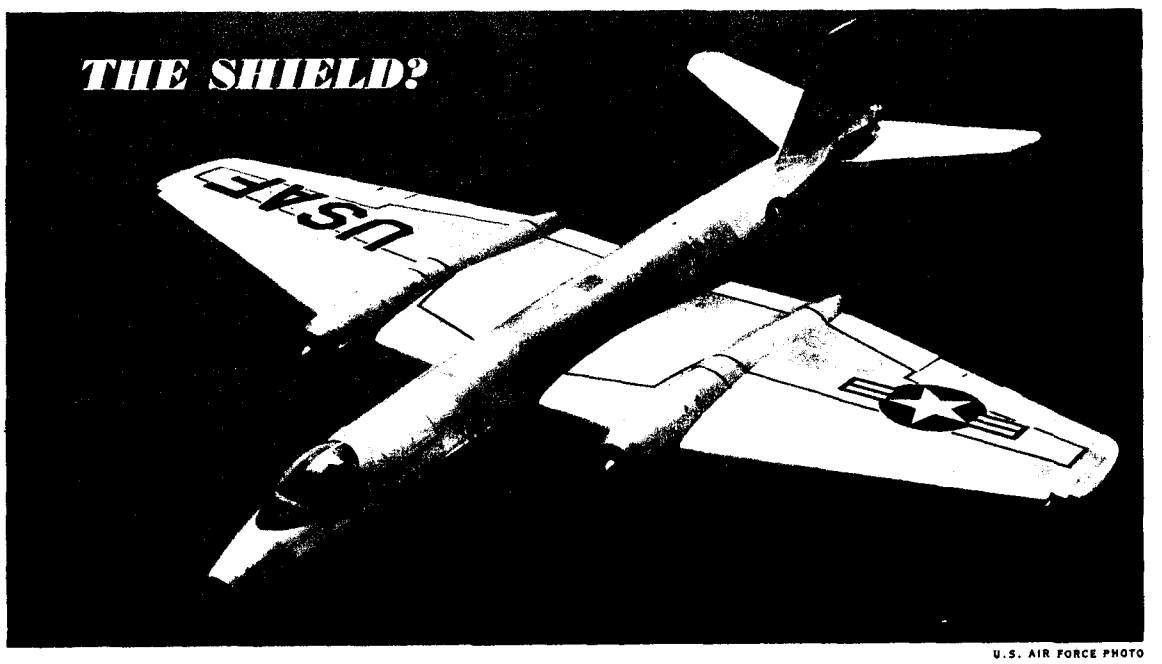


U.S. AIR FORCE PHOTO

Russia's basic carrier of atomic weapons is the TU-4, patterned on our B-29. From Arctic bases, it could fly one-way to any target in the U.S. outside Florida, with fuel to spare



U.S. AIR FORCE PHOTO

One plan for defense against TU-4 is to make a long-distance fighter-interceptor of fast new B-57. It has enough range to fly far into Canada, enough speed to bedazzle Red bomber

attack tomorrow, what defenses do we have—right here and now?

We have excellent fighter-interceptors—but not enough of them.

We have highly modernized and efficient anti-aircraft defenses, now being beefed up by Nike guided missiles battalions—but again, there aren't enough of them.

We have a Ground Observer Corps (ably supported by a like organization in Canada)—but it's badly understaffed.

We have an excellent civil and military communications system—but it's inadequate for the tremendous load an all-out Russian attack would put on it.

We have a partly completed perimeter of manually operated radar stations around the U.S., not only on our northern border, but on the coasts as well.

But there are too few of them, and they are too complicated for efficiency and too close to our industrial centers to give sufficient warning. Their detecting impulses extend roughly 150 miles out to sea—only a few minutes' flying time, by jet—and, depending on terrain, about 100 miles into Canada. They extend as far again into the U.S., in order to allow continuous tracking of an invader. One arm of this radar perimeter now extends to Labrador.

We have additional so-called islands of radar coverage deep inside the U.S., around such prime target areas as Los Alamos, Oak Ridge and Hanford.

We have a couple of Navy radar picket ships—still experimental and limited in range.

We have an adjunct to our defense system, set up in recent months and called TOMCIS (Test of Multiple Corridor Identification System). Under TOMCIS, the pilot of each incoming international airliner gets secret orders at his last port of call before heading for the U.S. The orders require him to fly a special pattern, always different, as he approaches this country. He must keep to that course. If our radar picks up a plane at the wrong place or time, an interceptor goes up to look the stranger over—and to shoot him down, if need be, over the safe, far reaches of the sea. When the system first started there were about 200 interceptions of wandering airliners a month. Now that most commercial pilots are getting used to the method, the figure is down to about 30 a month—but that's still too many.

There's the picture of our air defenses as they stand today—creaky, insufficient, agape with holes.

Moreover, there are weak spots which don't appear on the surface. Our radar net, thin as it is, is rarely in full operation at all points, although it tries to keep a 24-hour watch on our borders. All of its equipment is delicate and complicated, and at any given moment some components are out of action for maintenance or repair; neighboring installations have to try to cover the gap.

There's a human problem, too—and it has been one of the biggest flaws in the system.

Radar has to be watched, and watchers grow weary and confused—weary in monotonous areas like the Far North, where one blip on a radarscope is considered heavy traffic, confused in busy areas like the northeastern United States, where there's often too much happening for a single brain to figure it out.

I saw it work both ways.

At the Alaskan fighter-interceptor outpost where I observed the Russian reconnaissance-plane chase, I spent some time in the radome, standing behind a thin young officer hunched over a radarscope. He was watching the progress of a blip already identified as the plane of a low-flying bush pilot. The officer kept passing a hand over his eyes. "Watching these damn' scopes gets your eyes after about 30 minutes," he told me. "You lose your acuity." He looked weary, and welcomed another officer's offer to spell him.

Science of Radar Control Operation

Now look in, as I did, on a typical aircraft control and warning radar station in the U.S. proper. It was a dimly lighted, busy place—an amphitheater of radarscopes, with the center of the stage occupied by a big, vertical, transparent Plexiglas map, or plotting board. Behind the board stood two airmen and a WAF wearing earphones. As information poured in on the various scopes in front—some set for 10 miles, others for as much as 150 miles—it was telephoned to the three plotters. They lettered the information on the board in reverse, so that it could be read from the other side by the scope watchers in the front of the theater.

The mood of the room was tense; the men at the radarscopes kept staring up at the big board, their foreheads wrinkled, their lips tight. ("This," said a stocky little scientist standing near me, "is man's new attitude—to look toward heaven, his eyes clouded with doubt and fear.") There was reason for the tension.

Suppose a blip appears in one position on a radarscope—and information then comes in from another station indicating another plane in the same area.

Are there actually two planes, or just one? The difference in the angle of vision of the two scanning stations, perhaps 50 miles apart, could give the misleading impression that there are two planes when actually there's only one, but the watcher has to be sure. And the only way to be sure is to do a fairly complicated calculation. Now multiply that situation by the 30 or more tracks on the big Plexiglas board, and imagine the possible confusion.

Scores of time-consuming, brain-wearying multiple calculations beset our large aircraft and warning radar stations every day. Mental exhaustion is a constant hazard. When it overtakes our watchers . . .

That is the moment when time—and the Soviet—could overtake us.

* * *

For more than three years, from late 1946 to mid-1950, almost nothing was done to improve our continental defenses. We lived in a kind of heedless complacency, convinced that a cut-rate defensive system would serve the purpose. Then came Korea—and the nation awoke to the chilling fact that it takes guns to stop aggression. Beyond our vulnerable border with Canada there were no guns, nor even warning devices to set off the alarm in case of attack.

Our military men, given a go-ahead at last, began to seek out a method of getting the most protection in the quickest time and at the smallest cost.

They came up with two alternatives.

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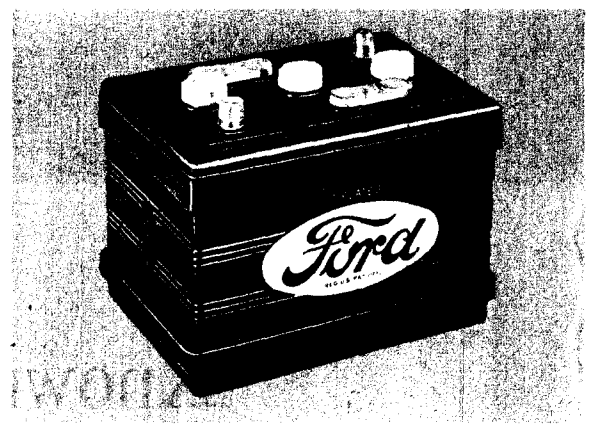

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Radar far from home—that's the answer to Russia's Hell-bomb

der radar to provide continuous tracking of any attacking bombers as they approached the continental United States; our fighter-interceptors and antiaircraft would then know the precise location and direction of enemy bombers, once the radar had picked them up. That would give a certain degree of protection, but not much warning in terms of time.

Or second, we could set up a new radar-alarm system, constructed far enough from United States borders (and targets) to give us the earliest possible notice that an attack was on the way. That wouldn't offer the same opportunity to pinpoint the location of an enemy bomber as he headed south—but it would mean a quick, timely warning, which might be the best protection in the long run.

Effectiveness of Radar Shown

Then the planners thought: Why not have both? Why not build gradually outward from our borders in advancing perimeters, and also establish a warning fence in the Far North, the two radar projects ultimately meeting in mid-Canada?

With strengthened border radar, we could increase the effectiveness of our home defenses. With the second step—known to military men as a Distant Early Warning, or DEW, Line—we could insure ourselves against another Pearl Harbor debacle.

We could get our strategic bombers—our counterpunchers—into the air and safely dispersed, ready to launch an attack as quickly as possible. We could alert our civil-defense system, and give ourselves time to take cover and time to prepare for a fight—time to save the nation.

The amount of time? With one hour's warning, the Strategic Air Command could get no more than 10 per cent of its bombers off the ground and out of harm's way. Three hours would raise the figure to 50 per cent. But a six-hour advance notice would enable virtually all the SAC's planes to disperse and launch a retaliatory strike. What's more, given that much time our fighter planes could rally to attack the intruders; the existence of a Distant Early Warning Line could mean the destruction of as many as 90 per cent of attacking enemy bombers before they could reach their targets—compared with the 30 per cent figure cited in 1950 by General Hoyt S. Vandenberg, former Air Force Chief of Staff.

But before the six-hour DEW Line could be built, there were some problems to lick.

Obviously, no defensive system could operate at top efficiency where so much depended on human eyes and human brains working under severe stress.

Also, a radar net in the Far North would cause a major communications headache. The best radio equipment then available was useless in the arctic for about four months out of every year because of polar magnetic storms; there had to be some way to get word from the northern DEW Line to the control centers in the United States. Finally, costs had to be held to a minimum.

The task of making the DEW Line a practical project was assigned to the Air Research and Development Command, a three-ring circus of military, scientific and industrial brains, directed by Major General Donald L. Putt from an old office building in downtown Baltimore.

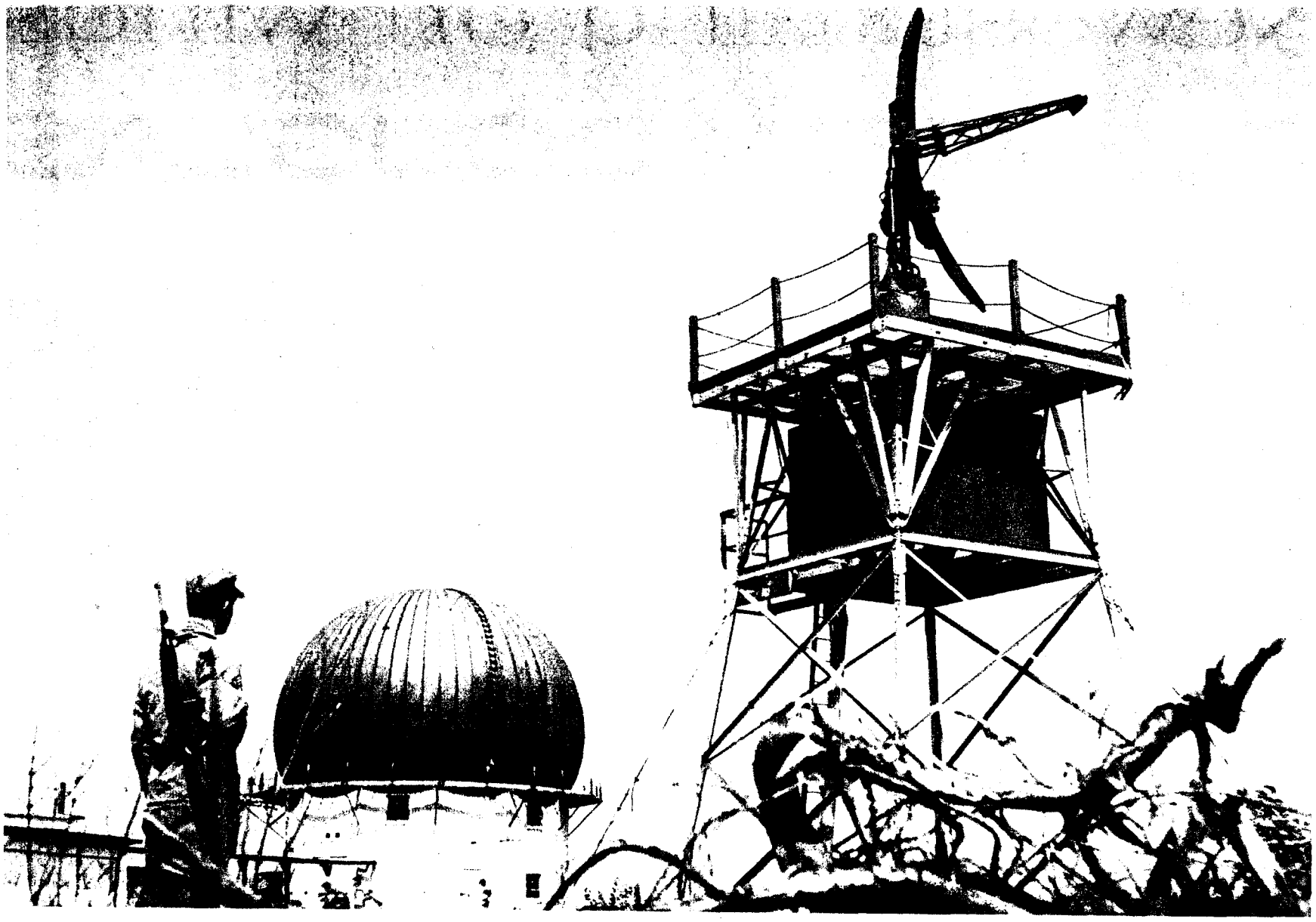
In 1950, ARDC let contracts for various parts of its research operation to the Rand Corporation, Associated Universities, Inc., Massachusetts Institute of Technology, and various other colleges, laboratories and scientific centers around the country. Their mission: "To perfect an automatic system for the collection, reporting and display of electronically digested intelligence (so it can) be channeled instantly to appropriate control and command centers where the early knowledge could be used for effective defense and counter-attack purposes."

"Automaticity" Latest Coined Word

The scientists coined a word for the solution to most of these problems. "Automaticity," a top scientist told me, "was the obvious answer. Man can still make the final decisions, but he's just not bright enough to compete with a machine, not quick enough to reduce the mathematical problems of modern war to actions which have to be taken at supersonic speeds. And even if man could do the job," he added, "he lacks the stamina to keep it up."

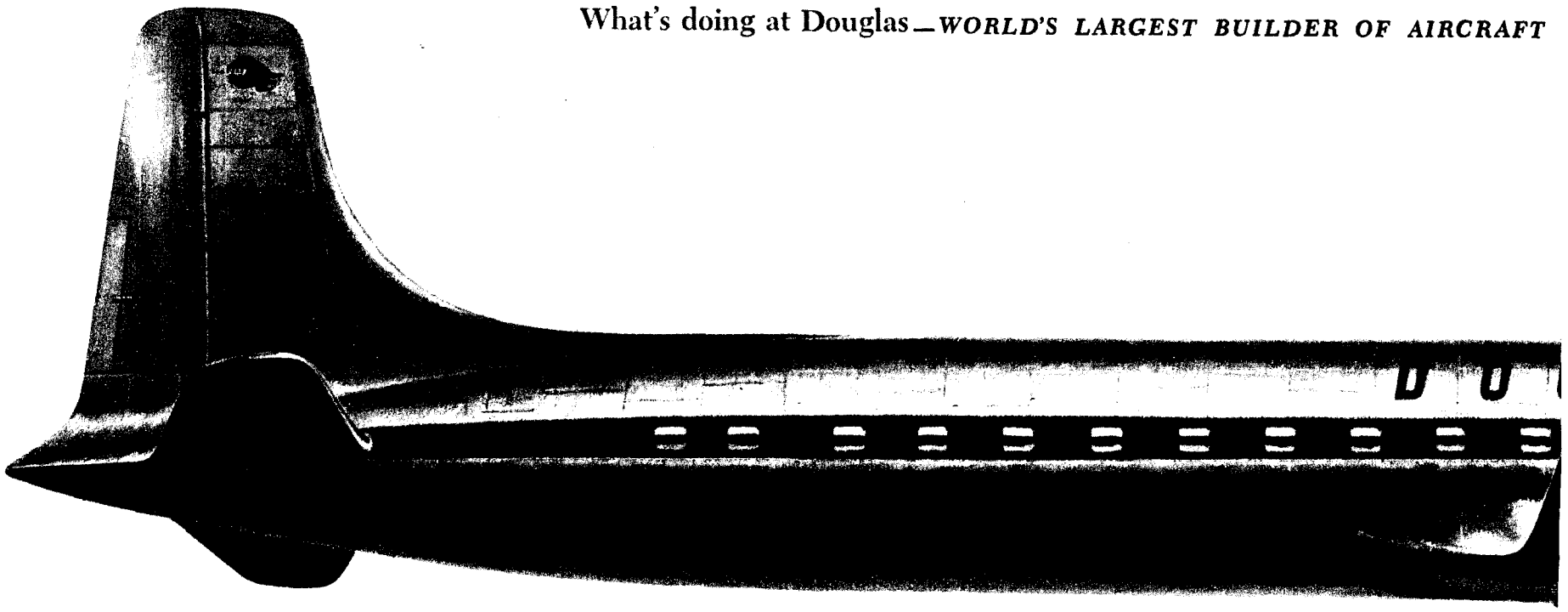
By last year, the scientists had come through with two revolutionary devices whose develop-

TED GOODMAN, USAF



One of our border radar stations. Search radar antenna is located under the dome at left, height-finder equipment on the tower at right

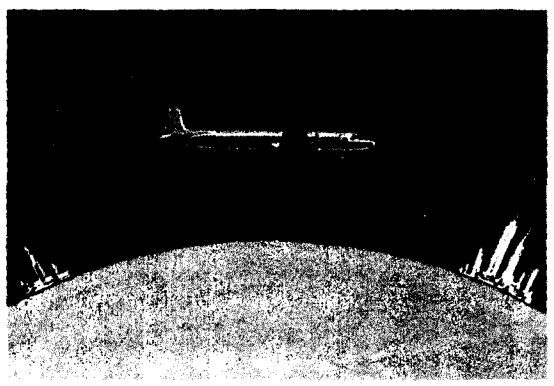
What's doing at Douglas—*WORLD'S LARGEST BUILDER OF AIRCRAFT*



Newest thing on wings

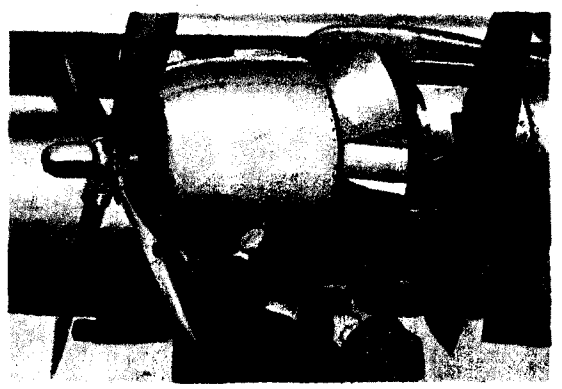
THE NEW DOUGLAS

★ ★ ★ ★ ★ ★ ★ ★ ★

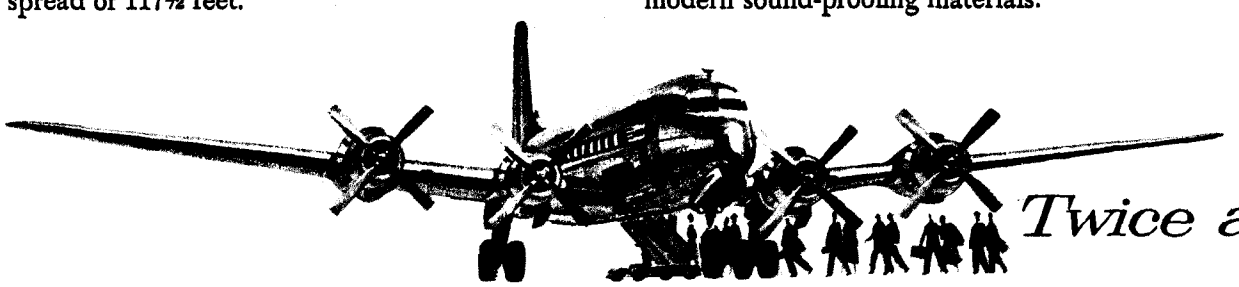


Coast-to-coast non-stop—7½ hours! The new DC-7 has a top speed of 410 m.p.h.; cruises at 365 m.p.h. No other U.S. airliner can go so fast—Los Angeles to New York in 7½ hours, New York to London in 10 hours. The huge, graceful DC-7 is 109 feet long and has a wing spread of 117½ feet.

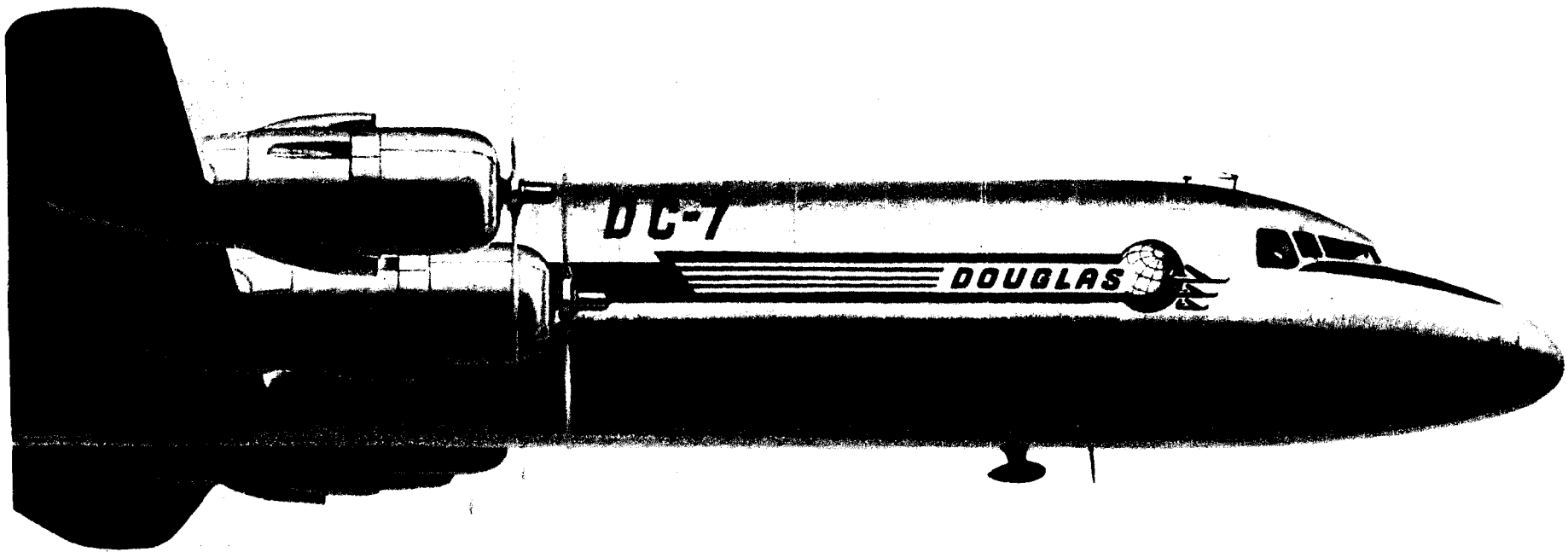
13,000 horsepower—hushed to a sleepy hum! Four giant Curtiss-Wright engines generate 13,000 horsepower. Jet turbines recover power that would be lost through the exhausts and send it to the propellers. Inside the plane, the big engines are effectively hushed by the most modern sound-proofing materials.



Uses new wonder metal, titanium! In the DC-7 titanium is used extensively in an airliner for the first time. Douglas pioneered the use of titanium in jet military planes. This lightweight, rustless metal has high strength at high temperatures—is ideal for engine nacelles and other uses.



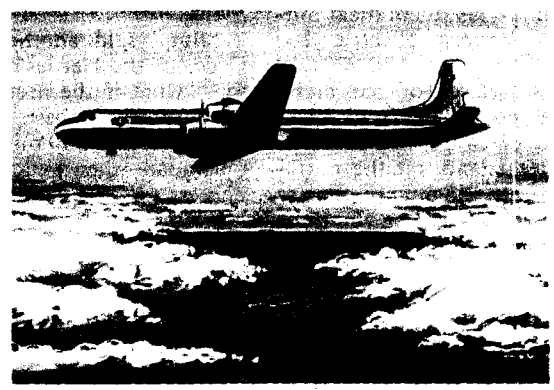
Twice as many people fly



DC-7

America's fastest and most luxurious airliner starts service soon

An extra air conditioner works while the DC-7 is on the ground at airports, as well as in flight. At all times, the cabin temperature stays in the pleasant 70's, even though the outside air may range from 120° above zero to 60° below. The air is perfectly *humidified*, too. And it is circulated without drafts.



Expect a smooth flight when you go by DC-7! The size and power of this big airliner make it remarkably steady in flight. It is pressurized to fly high above the clouds, where the air is sunny and smooth. And its long range permits the DC-7 to detour *around* many weather disturbances!

AMERICAN AIRLINES · Delta C&S AIR LINES · NATIONAL AIRLINES · UNITED AIR LINES

64 already ordered by four leading airlines—American, Delta-C & S, National and United. Many more orders are being negotiated. First scheduled flights will be made in the near future—watch your newspaper for the dates. Plan to make a trip *soon* in a DC-7. See how swift, luxurious and dependable it is!

DOUGLAS *as all other airplanes combined*

Today a foe could fly safely almost to our border

ment marked the technological "breakthrough" the military men had hoped for.

"First," an ARDC official in Baltimore told me, "we had to devise a completely new method of sure arctic communication by radio. Cable was no good, because of shifting ice and other terrain and weather considerations—to say nothing of possible sabotage. Second, we needed a warning device on the radar sets to relieve men in arctic stations of the brain-wearying job of staring endlessly at a blank scope."

Security still envelops both of the devices which solved these problems. But this much can be said:

The new radio transmitter sends messages well over 500 miles, and operates even more efficiently in the arctic than radio normally does in temperate zones. Instead of being knocked out of commission one third of every year by magnetic storms, it will get through 99 per cent of the time, year-round. It requires only 40 kilowatts of power, easily produced by Diesel generators. With the new transmitter, our combat commands within the United States will get radar intelligence from the arctic within three minutes after it's picked up by our outposts.

The new self-alerting radar is, in one respect at least, even more important. In essence, it's a radar set with a bell which rings whenever the scope picks up a signal (that sounds simple, but it took months of patient research to hook the visual radar to the audible bell). Now the radar will not have to be watched constantly. As a result, there will be far less strain on the men assigned to our radar outposts.

But the great significance of the new radar device is that it will bring about a truly astonishing saving in man power—10 men to a station, instead of the 300 once anticipated, an over-all reduction of perhaps 15,000 airmen and many millions of dollars.

Today, with the last theoretical hurdles cleared, Western Electric has started work, under a $20,000,000 contract, on a test leg of our arctic DEW Line: a few ten-man radar stations extending eastward in a 180-mile arc from Barter Island, off the northern Alaskan coast. Eventually, the arc will push farther and farther along the 72d parallel until it reaches Greenland, 2,000 miles away.

A husky engineer who had just flown back from the area told me: "We had to take up every nail, board and wire, every ounce of fuel and scrap of food, from Seattle and Portland, so we could get the building done during the short arctic summer." A huge supply convoy, including everything from Liberty Ships to LSTs, passed through Bering Strait in July—undoubtedly giving Russian radar operators a nasty few hours before it turned away from the Siberian coast and headed northeast toward Point Barrow.

In addition to the new manned radar stations, Western Electric is constructing several other stations which comprise a new wonder weapon in themselves: they are unmanned, and will do their reporting automatically.

These additional stations are needed because the manned stations are to be built about 100 miles apart, on an average—close enough so that their search beams overlap, but so far apart that enemy bombers could sneak through *under* the converging beams, or by ducking behind mountain ranges which are effective hiding places from radar. The unmanned radar sets will fill the gaps.

Duties of DEW Line

Precisely what will the DEW Line do?

It will simply alert officials in the United States to the presence of enemy planes. It won't be able to pinpoint their position, it won't be able to supply much information about them—but it will provide this much vital information: a warning that the planes are coming, and some indication of their number. As one Bell Telephone Laboratories engineer is said to have put it: "You'll know the planes are there—one, two, many . . . or jeepers creepers!"

When finished, the arctic DEW Line will consist of a string of manned stations, complete with arctic gap fillers and an all-season communications system to the interior of the United States.

"But," said another holder of the Order of the Heroes of the Soviet Union, "what if the arctic DEW Line is penetrated? At best, we can track an intruder 80 or 100 miles—the range of our radar—then we lose him in the wilderness. Washington and Ottawa will know only that someone has crossed the arctic headed south, probably with evil intent, else he'd have filed a flight plan and come in like anyone else instead of skulking through. Once he's well past our northern radar stations no one will have any idea where he is or where he's going until he's breathing down our necks.

"And that's why we've suggested the construction of a second DEW Line, down around the 65th parallel, or about 500 miles south of the first one."

In Baltimore, a general also spoke to me about the radar fence the experts are already calling DEW Line II. "It would begin to give us something really good in early warning," he said earnestly. "We could plot the course of an intruder crossing *two* lines. That would prove definitely that he was dangerous—and, more important, it would give us his course, so we could prepare our combat defenses."

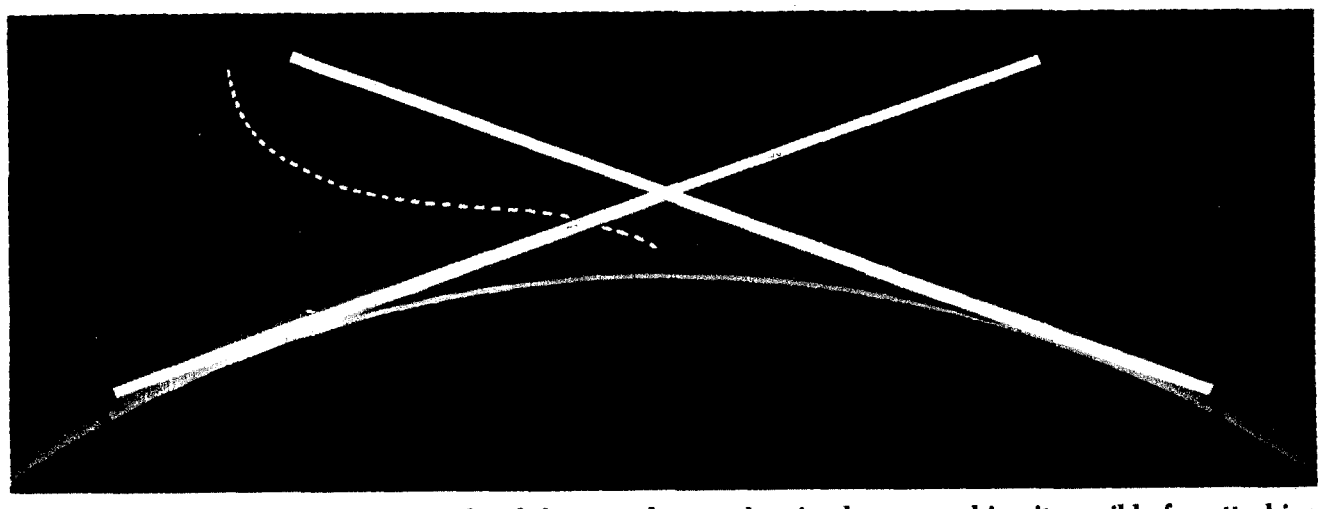
DEW Line II, lower down on the expanding face of the globe, would require more stations, running from Alaska across Hudson Bay to Labrador.

Besides the two DEW Lines, our early warning system undoubtedly will be extended over our exposed sea flanks, using radar-equipped Super Constellations—covering the Atlantic from Newfoundland to the Azores, the Pacific from Alaska to Hawaii. Without this flank protection, our whole air-defense system would be wide open to end runs, making the DEW Lines virtually useless.

Finally, U.S. military experts are hoping to improve radar defenses *within* the United States—around the borders and around large cities and vital defense installations. These so-called radar islands are already in existence, but they suffer from the usual radar shortcoming: there are potentially dangerous gaps under their beams and behind mountains and other terrain features. Now scientists, working closely with the Air Force, have suggested plugging these holes with small unmanned gap fillers, perhaps six or ten to every large radar.

But increasing the number of radar installations creates new problems. Remember the aircraft control and warning radar station in the United States, and the strained faces of the watchers trying to keep track of dozens of radar reports at once? What will happen to those men if the number of radar reports is greatly increased—if, instead of having to make sense of multiple reports from only one big radarscope, they're forced to keep track of eight or ten more besides?

Once more science came through



Curvature of earth causes holes in radar defense under overlapping beams, making it possible for attacking planes to slip past undetected. Solution is to put automatic radar gap-fillers between manned stations

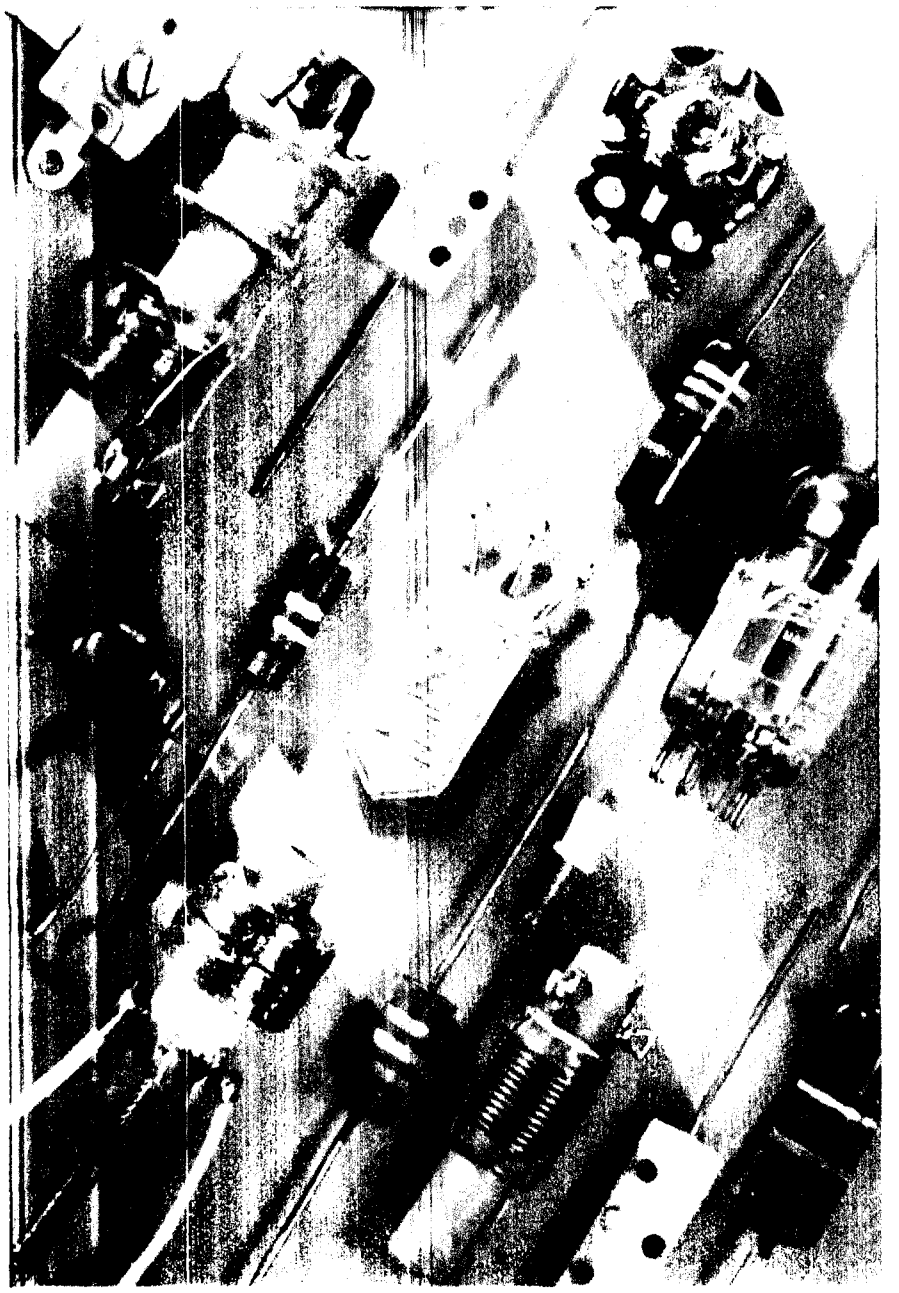
One irreplaceable part holds the secret of better television

Even if you are an electronic engineer, you may find it difficult to name the irreplaceable part in a new 1954 Zenith television receiver.

For it is not among the maze of coils and condensers pictured here. Nor is it one of the tiny, sensitive tubes through which pass the precise impulses that govern the beauty of the picture you see and the steady clarity of the tones you hear.

The irreplaceable part is the Zenith crest.

You'll find a Zenith crest like the one in the picture on every Zenith Television Receiver. It is the symbol of the Zenith ideal—to build *every* television receiver to *one standard* of quality—the highest attainable. Like 14 carat gold the Zenith crest always stands for the same kind of quality. It is the reason you can be sure of better television, whether the Zenith you choose costs $179.95* or $1250.*

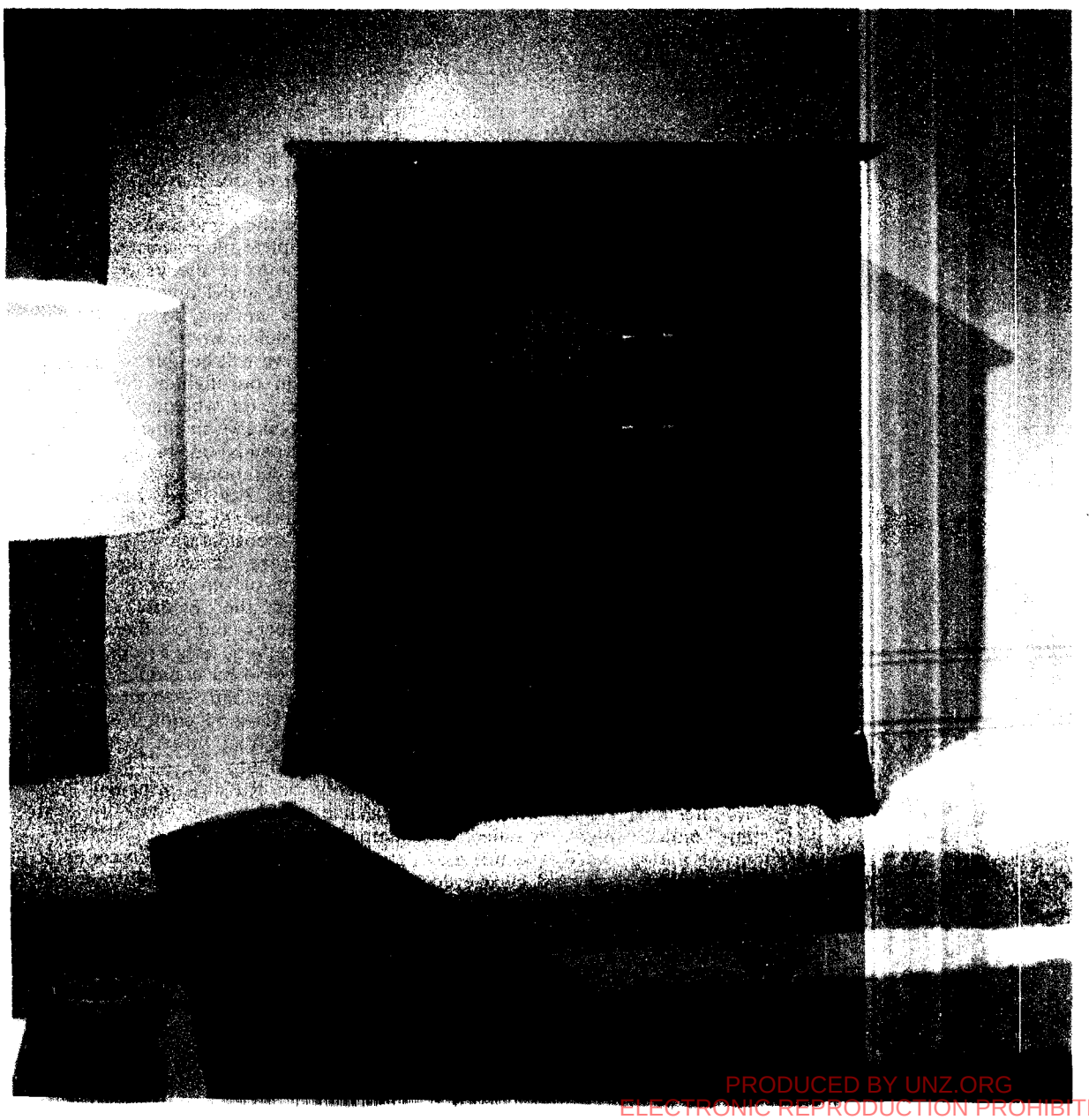


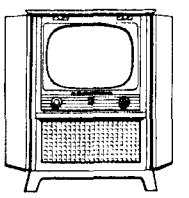
ZENITH

The royalty of radio and TELEVISION®

Backed by 35 Years of "Know-How" in Radionics Exclusively

Also makers of fine hearing aids





New 1954 Zenith TV receivers bring you the really new things you want

Brilliant new Zenith Cinébeam picture tubes bring you big, clear pictures—beautifully in focus over every inch of screen with richer black and white contrasts. 21, 24 and 27-inch screens.

Zenith's exclusive new Bandshell Speaker gives you Table TV with big-set tone. Pops up and beams sound right at you, like consoles do. On 21 and 17-inch Zenith table models.

Your choice of TV's 2 best ways of tuning with Zenith's famous one-knob UHF-VHF Turret Tuner which can now be teamed with a revolutionary new Zenith Continuous All-Channel Tuner bringing you fast, faultless tuning of all 82 channels. (Continuous Tuner, optional and extra.)

Large, lighted channel numbers on Zenith's modern Spotlite Dial for exclusive Turret Tuner lets you see which channel you're tuned to at easy-chair range. Number changes automatically as you switch stations.

In addition Zenith's "Lazy Bones" Remote Control lets you change channels without leaving your chair. And Zenith "Private Phone" TV earphones give you personal TV volume control. (Both optional at slight extra cost.)

The Zenith Nocturne—$479.95* Console Model L2267Y, a striking Modern in genuine Ebony veneers and solids. New 21-inch Zenith Cinébeam picture tube. *Manufacturer's suggested retail prices include Federal Excise Tax and Parts and Tube Warranty. Slightly higher in South and Far West.

ZENITH RADIO CORPORATION, Chicago 39, Illinois

Can't our radar be attacked? Yes

with a brilliant solution: an adaptation of the high-speed electronic computer, the ultimate in automaticity.

Not only will the new computer evaluate any number of radar reports—it also will take into consideration every other possible pertinent fact: ground-observer reports, the weather, flight plans and so on. No longer will men and women have to scrawl radar tracks painstakingly (and backward) on transparent boards. No longer will the watchers knit their brows over the results.

Here's what will happen instead:

At any one of the Air Force's big combat centers, a team of officer specialists will sit in front of big individual radar consoles, each equipped with rows of buttons and switches so the watcher can call up precisely the information he wants. When a tracker thinks he has an actual intruder, he'll buck the radar picture along to the identification officer's screen, while the electronic computer busily figures out the mystery plane's speed, position, heading and the like. The identification officer will call on the computer for civilian and military flight plans, ground observer reports, everything he needs to make a prompt identification; it has a "memory" for such matters and will supply them on request.

If the blip on the identification officer's radar screen remains a mystery, he swiftly passes the picture to the boss, the sector commander (probably a brigadier general), who sits with the weapons assigner. They study the blip—then do the job that no machine, however efficient, can do: exercise intelligent judgment.

The weapons assigner transfers the still-unidentified picture quickly to the interceptor officer, who is in touch with a nearby air base. He then orders a scramble.

As the single jet takes off to investigate, the interceptor officer tells the pilot where he'll find the intruder, reading off information supplied by the computer (in the not too distant future, the computer will be able to pass its information directly to the pilot; he will read the course, altitude and position of the stranger from dials in his cockpit).

Antiaircraft Is Made Ready

Meanwhile, the weapons assigner has flipped a second switch, and the blip appears before still another man, the antiaircraft liaison officer, who sits ready to bring into play all the antiaircraft guns and rockets in the area if the interceptor attacks and misses, or is shot down.

From the time an enemy plane is first sighted on the radarscopes to the moment it's brought under fire, only a few minutes have elapsed—and in the bustling combat centers, the officers on whom the nation's very existence may depend are still fresh and clear-eyed, ready for anything.

In a very real sense, the new electronic computer is the key to the whole early-warning setup—the device that ties everything else together and makes it work.

But one vital component is still missing. A warning of impending attack is all very well—but it doesn't provide protection. That is the job of the fighter aircraft, guided missiles and antiaircraft guns.

* * *

A Russian bomber which approached the United States through central Canada today, or via the East or West Coasts, would not only go undetected until it was almost at our borders—it would go unattacked as well. Even if the two DEW Lines were already in operation, there wouldn't be a fighter plane for miles around—until the enemy was virtually within striking distance of United States territory.

We have fighter-interceptor bases in eastern Canada, mainly in Labrador, and in the west in Alaska. In between, there's a deep pocket, aimed straight at the heart of our nation. Why is it there?

"It's just about time you turned over an old leaf!"

COLLIER'S — CHARLES SKILES

Partly for the same reason we don't have a complete radar-warning system today—because of the years between World War II and Korea in which we did little or nothing to prepare our continental defenses.

Whether we will be able to meet the deficiency in our fighter defense depends largely on whether the planes are made available in time—and that, in turn, depends on budgetary and policy considerations.

Meanwhile, Air Force officials are making additional plans. One suggestion under consideration is that we develop heavy patrol fighters—or modify some of our new B-57s, patterned after the British Canberra fighter bomber—and set them patrolling in overlapping arcs across the border. They would have enough range to fly deep into Canada—about as far as DEW Line II—and enough speed to make them a real threat to the relatively slow-flying TU-4, which will probably be Russia's principal long-distance bomber for some time to come.

These multiengine jet fighters could harass enemy bombers all the way south, calling for help en route from short-range interceptors.

The experts are also counting on another development to help turn back

ut that's all the alarm we'll need

enemy squadrons: air-to-air rockets, launched by radar-electronic fire-control systems which would provide a pattern almost impossible to evade. They may eventually be armed with atomic warheads, and they certainly will have proximity fuses which will cause them to explode at precisely the right moment. Security won't permit any further description of these missiles, but their possibilities are obvious.

Something must be done, and our officials are well aware of it. Warning is no good without protection. Their aim is to have the protection ready—in some form—by the time our DEW Lines go into operation.

* * *

What will it all cost? Manned radar, gap fillers, long-distance radios, self-reading radarscopes, complicated electronic gadgets . . . won't they be tremendously expensive?

Here are the figures, as nearly accurate as they can be right now—the first realistic estimates ever published of the expected hardware price of our planned radar-warning system (not including maintenance or operating costs):

For DEW Line I: $45,000,000.

For the longer DEW Line II: $75,000,000.

For extending our sea-approach warning line: $450,000,000.

For strengthening our border radar: $15,000,000.

For several hundred gap fillers: $60,000,000.

For 30 electronic computers: $180,000,000; for phone lines, office equipment, buildings, etc.: $500,000,000.

The total: $1,325,000,000.

In addition, some $518,000,000 already has been spent on the present radar-warning system. It must be emphasized that the grand total of $1,843,000,000 in money spent or to be spent buys the U.S. vitally needed warning and combat tracking ability, but no defensive weapons to do the fighting.

The one and one-third billion dollars still to be spent is a lot of money. But it's not 150 billion dollars, the figure that some people have reckoned as the cost of radar warning. And it's insignificant when matched against the total defense budget for 1953-'54 of $34,372,000,000.

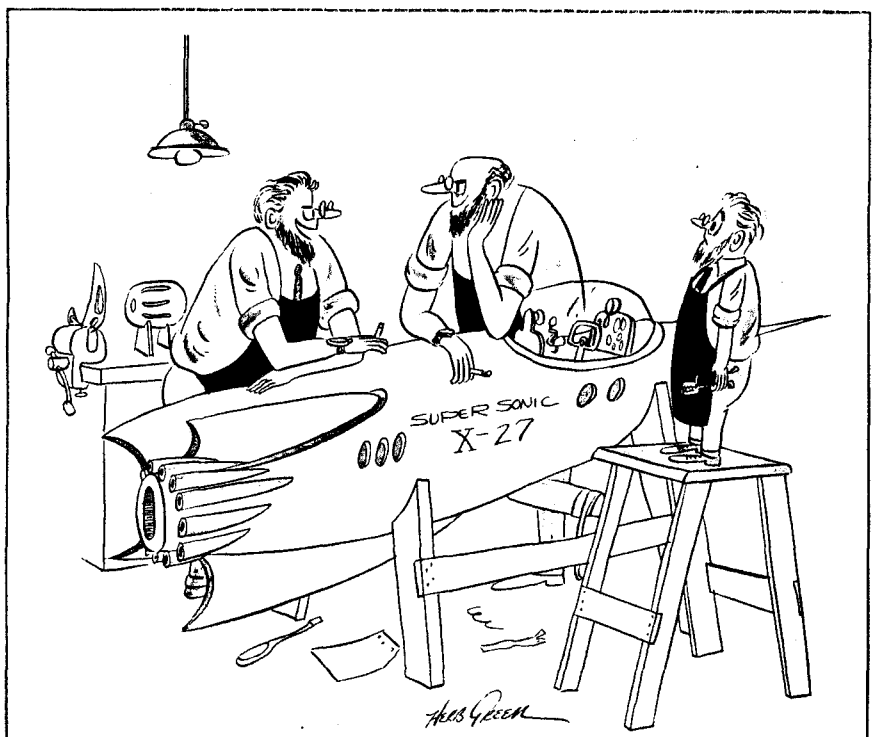
Most important, the money, in the estimate of our top scientists and military planners, might pay for the survival of the nation at a moment when nothing else is available. Although these vitally needed funds are not yet in the budget, we can't afford not to spend the money.

Won't the whole early warning system be vulnerable to enemy attack? That's one of the points raised by critics of the plan, both within and outside the Air Force. One man told me, "The Soviet would probably try a three-phase attack: First, bomb out our radar intelligence; second, shatter our strategic bombing bases, both at home and abroad; third, use the H-bomb or atomic bombs on a dozen major cities, atomic plants and industries, then proceed to demolish what's left in leisurely and economical fashion.

"Where would the DEW Lines be then . . . ?"

One of the greatest brains in arctic radio communications, to whom I reported this criticism, replied sharply: "The day the Russians attack DEW, either by air or ground, that in itself will be actual war. The price for this advance warning is small compared with what that warning can save us.

"These DEW stations are not fortresses! You could call them electronic versions of the old cavalry vedettes, the advance guards whose one job was to warn the main body. Sure, they might be lost in the early skirmishes—which is another good reason for keeping the number of men in each station to an operational minimum. Every one of those men deserves the highest—" he stopped and angrily flipped away his cigarette. "Well, what more do you expect to buy in a world like this? We'll warn you—but we can't guarantee you security, too!" ▲▲▲



COLLIER'S "Well, now that it's completed, which one of us gets to be the pilot?" HERB GREEN

HONG KONG Decision

She had fought her way almost to freedom, but her last avenue of escape had closed. Now the finest man she had ever known was offering her a way out—if she'd take it

By WILLIAM L. WORDEN

THE two stories began a long way and a long time apart, and I was there at both beginnings—at the end, too, although there never was any real reason for my presence. So far as I was concerned, one story began on a headquarters island in the Pacific, a big and fancy headquarters established in the last days of the second World War.

George Barstow and I came back together from one of the lesser landings; and when we got to press headquarters on the island, things had changed. The island was crawling with enough brass to start a foundry; and the brass had brought along their own press, a great spate of correspondents, resplendent in new uniforms and weighted down with wonderful insignia.

These were the fat cats—representing everything from fashion magazines to the dog fanciers' journal—and the Thinkers, with a capital T. These were the big-picture boys who could tell the admirals all about ships and give generals the very latest word on invasion tactics.

And the fattest cat, with the greatest amount of inside dope, was Harry Thorne. It was Harry who sat in the front row at press conferences and asked authoritative questions. Although he'd never been on one, somehow it was Harry who told an admiral the most about making press arrangements for the next combat landing. A small man, somewhat pudgy and equipped with freewheeling opinion about everything—that was Harry; and a great American radio network thought he was wonderful.

Well, it was none of my business. That first night back on the island, George Barstow and I looked in on a poker game in the correspondents' quarters; and Harry was there too, winning steadily and tossing twenty-dollar bills over his shoulder into an untidy heap in a corner of the room. We watched the game a while before George signaled to me.

As we went down the hall, I heard Harry's voice, above the others. "I quit," he said, "you guys are no competition. Let's sing a song. Let's sing about Morgan Junior High School. It's a great town, Morgan, and I can always go back there and

ILLUSTRATED BY ROSWELL KELLER